



Assessment Date: June 4, 2003

#### Benefits:

- Saves more than \$27,000 per year in energy costs
- Reduces total energy use by 14.9% per year
- Has payback periods ranging from 1 month to 2 years

#### Applications:

To reduce energy usage and costs and increase capacity, productivity, and product quality, the assessment team focused on manufacturing processes as well as process water controls, grinding, lighting, heating, and compressed air.

## N-K Manufacturing Technologies: Industrial Energy Assessment Yields Savings of More Than \$27,000 Per Year for Molded Plastics Company

### Summary

The University of Michigan's Industrial Assessment Center (IAC) performed an energy audit at the N-K Manufacturing Technologies' plastics manufacturing plant in Grand Rapids, Michigan; implementing many of the audit's recommendations could save the company more than \$500,000 each year. The IAC, sponsored by the U.S. Department of Energy (DOE) Industrial Technologies Program (ITP), is one of 26 across the nation in which faculty and students provide eligible small- and medium-sized manufacturers with no-cost energy assessments. This assessment project was sponsored by ITP and The Society of the Plastics Industry, Inc. (SPI), a DOE Allied Partner.

Opportunities for saving electricity identified in the N-K Manufacturing Technologies assessment involved installing several devices to control the use of both motors and electric heaters. Ideas for saving natural gas involved making changes to the plant's heating system. The assessment team noted that installing grinder chutes, high-efficiency lamps, and destratification fans would reduce energy consumption by more than 1,783 MMBtu and reduce energy costs by more than \$27,000 each year. The team also found that installing large storage tanks with environmental controls would increase productivity and efficiency and reduce material costs, for an additional substantial cost savings of \$573,000 per year.

### Company Background

N-K Manufacturing Technologies, is a custom molder of plastics for the automotive and other industries. The company, which specializes in multishot, insert, and overmolding technologies, is part of the Nicholas Plastics Group, a single-source, vertically integrated provider of plastic solutions for the automotive, office furniture, appliance, and related industries. Based in Grand Rapids, Michigan, the Nicholas Group has manufacturing facilities in Allendale and Grand Rapids and a technical sales and design center in Troy. The facility that was assessed measures 80,000 square feet. It had a total energy budget of approximately \$185,714 per year; most of that expense was for electricity and the remainder for natural gas.

### Assessment Approach

A team of students and staff from the University of Michigan IAC carried out the assessment on June 4, 2003. The assessment was led by IAC Assistant Director Dr. David Everest. The approach emphasized increasing employees' awareness of energy conservation and enhancing productivity as well as reducing process energy use.



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## Recommendations

**Energy Conservation Awareness.** The assessment team found that 100% of the facility's total natural gas consumption was used for heating. Of the electricity used, 66% of the total powered the hydraulic motor drives, 13% powered grinders, 10% was used for lighting, 3% went to process chillers, and another 3% was used by the compressed air system. Therefore, the team identified several cost-effective ways that employees could significantly reduce the plant's energy consumption. For example, they encouraged employees to turn off or shut down all idle processing equipment, lights, fans, air compressors, and other energy-consuming items when they were not in use.

**Productivity: Labor and Materials.** During the summer, the facility has to dehumidify most of its polymer pellets before they can be used. The drying time can range from 1 to 3 hours, depending on the product and humidity levels. During this time, the production machine is inactive and workers are sometimes idle, increasing non-value-added labor hours. The assessment team recommended installing large storage tanks with dehumidification units to dehumidify the pellets before they are taken to the production machines. This will reduce machine downtime and non-value-added labor hours. The storage system will also allow the company to buy products in quantity at a lower cost. And, it will help to keep the material clean, even during transport.

## Results

The table below shows the estimated annual cost savings and paybacks associated with N-K Manufacturing Technologies' decision to implement four of the six assessment recommendations for the plant. The implemented recommendations will reduce natural gas usage by nearly 1,000 MMBtu and electrical usage by almost 261,000 kWh, which will lower electrical demand by approximately 1,825 kW-month per year.<sup>1</sup> The facility can increase productivity, reduce labor costs by more than 3,900 labor hours, and save 7% of material costs. These savings will then reduce natural gas usage, electrical usage, and electrical demand costs by more than \$27,000 per year.

### Implemented Recommendations for N-K Manufacturing's Plant in Grand Rapids, MI

| Project Category/<br>Recommendation  | Annual Resource<br>Savings | Annual Cost<br>Savings | Implementation<br>Cost | Payback<br>Period |
|--|----------------------------|------------------------|------------------------|-------------------|
| <b>Fuels</b><br>Replace electric equipment<br>with gas equipment                   | 365 MMBtu                  | \$17,350               | \$8,000                | 6 months          |
| <b>Compressed Air</b><br>Eliminate leaks in gas and<br>compressed air lines/valves | 58 MMBtu                   | \$910                  | \$75                   | 1 month           |
| <b>Heating</b><br>Install destratification fans                                    | 1,027 MMBtu                | \$4,275                | \$2,100                | 5 months          |
| <b>Lighting</b><br>Install high-efficiency lamps                                   | 333 MMBtu                  | \$5,270                | \$10,510               | 2 years           |
| <b>Total</b>   | <b>1,783 MMBtu/yr</b>      | <b>\$27,805</b>        | <b>\$20,685</b>        |                   |

<sup>1</sup> kW-months per year represents total kW savings per year, based on kW savings per month.

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### Project Partners:

N-K Manufacturing Technologies  
Grand Rapids, MI

The Society of the Plastics  
Industry, Inc.  
Washington, DC

### For Additional Information:

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